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GIET MAIN CAMPUS AUTONOMOUS GUNUPUR – 765022
B. Tech Degree Examinations, November – 2021
(Seventh Semester)
BCEPC7010 – WATER RESOURCES ENGINEERING
(Civil Engineering)

Time: 3 hrs   Maximum: 100 Marks

Answer ALL Questions
The figures in the right hand margin indicate marks.

PART – A: (Multiple Choice Questions)   **(2 x 10 =20 Marks)**

Q.1. Answer *ALL* questions   [CO#]   [PO#]

a. Hytometer method is generally used for the measurement of   [CO1]   [PO2]
   (i) Interception   (ii) Evaporation
   (iii) Transpiration   (iv) None of these

b. In India the recording type rain gauge generally used, is   [CO1]   [PO3]
   (i) Weighing type   (ii) Tipping type
   (iii) Float recording type   (iv) None of these

c. Precipitation caused by lifting of an air mass due to the pressure difference, is   [CO1]   [PO2]
   called
   (i) Cyclonic precipitation   (ii) Convective precipitation
   (iii) Orographic precipitation   (iv) None of these

d. Evaporation losses depend upon   [CO2]   [PO3]
   (i) Area of the water surface and depth   (ii) Nature of precipitation and type of
   of the water   vegetation
   (iii) Humidity and wind velocity   (iv) All the above

e. A unit hydro graph has one unit of   [CO2]   [PO1]
   (i) Rainfall duration   (ii) Rainfall excess
   (iii) Time base of direct runoff   (iv) Discharge

f. A unit hydrograph is a hydrograph of a rain storm of a specified duration   [CO3]   [PO4]
   resulting from a run-off of
   (i) 15 mm   (ii) 20 mm
   (iii) 25 mm   (iv) 30 mm

g. A repelling groyne is aligned   [CO3]   [PO3]
   (i) Pointing upstream   (ii) Pointing downstream
   (iii) Perpendicular to bank   (iv) Parallel to bank

h. The Froude's number for a flow in a channel section is 1. What type of flow is it?   [CO4]   [PO3]
   (i) sub Critical   (ii) Critical
   (iii) Super critical   (iv) Tranquil

i. What is the Froude's number for a channel having mean velocity 4.34 m/s and   [CO4]   [PO3]
   mean hydraulic depth of 3m?
   (i) 0.4m   (ii) 0.6m
   (iii) 0.7m   (iv) 0.8m

j. Calculate the mean hydraulic radius for a channel having 20m2 cross sectional   [CO4]   [PO3]
   area and 50m of wetted perimeter
   (i) 0.4m   (ii) 0.5m
   (iii) 0.6m   (iv) 0.7m

PART – B: (Short Answer Questions)   **(2 x 10 = 20 Marks)**

Q.2. Answer *ALL* questions   [CO#]   [PO#]

a. What is the possible source of error in the measurement of rainfall?   [CO1]   [PO2]
b. What are the factors affecting the process of infiltration?   [CO1]   [PO3]
c. Write any four factors affecting Evapotranspiration?   [CO2]   [PO4]
d. State the applications and limitations of the Unit Hydrograph?   [CO2]   [PO2]
e. Describe the principle of working of a float type rain gauge with a neat sketch?   [CO3]   [PO3]
f. Define unit hydrograph?   [CO3]   [PO2]
g. What are the limitations of hydrograph?   [CO3]   [PO3]

h.	Enumerate the effects of floods?		[CO3]	[PO2]
i.	Define (a) wetted perimeter. (b) Hydraulic mean depth?		[CO4]	[PO3]
j.	What do you understand by the term most economical section of channel?		[CO4]	[PO2]

PART – C: (Long Answer Questions)   **(15 x 4 = 60 Marks)**

Answer *ALL* questions   Marks   CO#   PO#

3. a. What are the various forms of precipitation? Explain briefly?   7   CO1   PO2

   b. The average annual rainfalls of 5 rain gauges in a basin are 89,54,45,41 and 55 cm. If the error in the estimation of basin mean rainfall should not exceed 10%, how many additional gauges should be installed in the basin?   8   CO1   PO3

(OR)

   c. Explain in detail any two methods for controlling evaporation?   7   CO1   PO2

   d. A seven hour storm produced the following rainfall intensities in mm/h at half an hour intervals over a basin of area 1830 km2 are 4, 9, 20, 18, 13, 11, 12, 2, 8, 16, 17, 13, 6 and 1. If the corresponding observed runoff is 36.6 million m3 , estimate the φ-index?   8   CO1   PO2

4. a. The ordinates of the 6-hour hydrograph of a catchment are given below. If two storms, each of unit rainfall excess in 6 hours duration, reach the catchment in succession, then draw the hydrograph resulting from these two storms. The stream may be assumed to have a uniform base flow of 5.0 cumec.   8   CO2   PO2

Time (h)	0	6	12	18	24	30	36	42	48	54	60	66
Ordinate of 4-h .H(cumec)	0	20	50	160	130	80	70	50	30	20	10	0

   b. What is unit hydrograph? Stating the assumptions, explain the derivation of a unit hydrograph from a storm hydrograph?   7   CO2   PO3

(OR)

   c. Given below are the ordinates of a 4-hour unit hydrograph of a basin in m3 /s at one hour intervals. 4, 25, 44, 60, 70, 61, 52, 45, 38, 32, 27, 22, 18, 14, 11, 8, 6, 4, 2 and 1. Derive 2-hour unit hydrograph?   8   CO2   PO3

   d. What is stream gauging? How it is useful? Explain the area-velocity method of stream gauging?   7   CO2   PO2

5. a. Explain the various factors affecting the runoff?   7   CO3   PO3

   b. Explain Guide banks and groynes with neat sketches?   8   CO3   PO2

(OR)

   c. What is river training? What are the objectives of river training?   7   CO3   PO2

   d. What is meant by 'flood routing through reservoirs'? Explain the step-wise procedure adopted for flood routing by Puls Method?   8   CO3   PO3

6. a. A rectangular channel carries water at the rate of 400 litres/sec when bed slope is 1 in 2000. Find the most economical dimensions of the channel. Take manning's constant n as 0·012?   7   CO4   PO3

   b. A trapezoidal channel has side slopes of 1 horizontal to 2 vertical and the slope of the bed is 1 in 1500. The area of section is 40 m2. Find the dimensions of the section if it is most economical. Also determine the discharge of the most economical section if C = 50?   8   CO4   PO2

(OR)

   c. A rectangular channel having most economical section is 6m wides. Find the discharge, if the bed slope is 1 in 1200. Assume C as 50?   7   CO4   PO4

   d. A trapezoidal channel has side slopes 1: 1 and is discharging 20 m3/sec with bed slope of 0·5 m per 1000 m. Mannings n = 0·01. Determine the section of the channel?   8   CO4   PO2

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